REMARKS

This case after having been fully and fairly prosecuted to a focused Appeal has been remanded to the Examiner for yet another "bite at the apple". This rejection of these method claims (*emphasis added*) fairs no better than the previous one.

This application is a Divisional of U.S. Application Serial No. 10/272,382 having been restricted out by a restriction from the parent case. Claims 1 and 2 have been limited to nutritional supplementation with 1:1 neutral complexes, that is, a complex containing one ion of the trace element for each molecule of the dicarboxylic α-amino acid, with the molecule of the complex carries a net zero charge. Bases for this limitation is provided in the specification at, for example page 7, pointing out that 1:2 complexes are less effective pro-nutrients, having a lower metal content, and more costly than 1:1 complexes formed in the present invention. Additionally, 1:1 complexes are formed in the presence of basic pH, not acid pH. The complexes in this invention are a combination with a dicarboxylic α-amino acid moiety. The amino acid ligand serves a dual role as a bidentate ligand that forms a 1:1 complex with metal ion, and acts as the counter ion to balance the charge on the cationic complex of the metal and amino-acid carboxl moiety. It also enhances bioavailability of the trace element in comparison with simple salts.

Claim Rejections – 35 U.S.C. § 112

In claim 1, the Examiner objects on the basis that "an essential trace element" is ambiguous. Applicants respectfully traverse this objection. The term "an essential trace element" has a specific meaning that is generally accepted and known and understood by individuals engaged in the field of nutrition at a date much earlier than the filing date of the present invention. The term refers to those elements that are present in animal, as well as human,

tissues and diets in amounts smaller than that of other macronutrient elements, such as sodium, potassium, calcium, magnesium, and phosphorous. The essentiality of a trace element is established by regulatory agencies and scientific communities. In the United States, the National Research Council (NRC) issues its findings and recommendations after reviewing available studies that demonstrate the essentiality of a specific element in a number of species. The studies upon which the NRC bases its recommendations are rigorous, and well designed and executed.

There are many references to "trace element" which support that the term is far from ambiguous and is widely used and relied upon in the field of nutrition. Examples include: 1) an international symposium that is held every two to three years entitled "Trace Element Metabolism in Man and Animal, TEMA;"[1] 2) a scientific journal entitled "Biological Trace Element Research" which is published semi-monthly by Human Press, Inc., Totowa, New Jersey; 3) a scientific journal entitled "Journal of Trace Elements in Experimental Medicine" which is published quarterly by Wiley-Ross, Hoboken, New Jersey; 4) a scientific journal entitled "Journal of Trace Elements in Medicine and Biology" which is published quarterly by Urban & Fisher Verlag, Jena, Germany; and 5) a scientific journal entitled "Trace Elements and Electrolytes" which is published quarterly by Dustri-Verlag, Dr. Karl Feistle, Muenchen, Germany. The list goes on, but the point is made that the term is one commonly known and recognized in the field of the invention and is far from ambiguous. *See Hoechst Celanese Corp. v. BP Chemicals Ltd.*, 78 F.3d 1575, 1578 (Fed. Cir. 1996) (citations omitted) ("[a] technical term used in a patent documents is interpreted as having the meaning that it would be given by persons experienced in the field of the invention . . . "); *see also National Tractor Pullers Ass'n,*

[1] TEAM 1, the first symposium, was held June 1969 in Aberdeen, U.K.; the latest symposium, TEMA 12, was held June 2005 in Colraine, Northern Ireland.

Inc. v. Watkins, 205 U.S.P.Q. 892, 913 (N.D. Ill. 1980) (citation omitted) (reasoning that where there is language as precise as the subject matter permits and those skilled in the field can reasonably appraise the meaning, an area of uncertainty is not sufficient justification to deny the patentee). Thus, the Examiner's objection should be withdrawn as the term "essential trace element" is known and used in the field of the invention, and supports the scope of the claim as definite.

Additionally, the Examiner contends that the phrase "an essential trace element . . . to an animal" is vague. Applicants respectfully traverse this objection. The Examiner's interpretation of the information in the referenced text and table is incorrect. The Examiner uses as a reference for the objection a table in a textbook which is a secondary source. This table summarizes the nutrient requirements for maintenance, and lists the NRC Nutrient Requirements of Domestic Animals as the source of the information. Secondary sources are often incomplete and may be inaccurate. For example, the table the Examiner cites does not provide the requirements for sodium, potassium, magnesium, sulfur, iron, zinc, manganese, copper, iodine, cobalt and selenium for beef cattle, but does give the information for dairy cattle. Does this mean that these nutrients are not essential for beef cattle, but are essential for dairy cattle? Not necessarily. Information could be missing for one of many reasons. It is possible that the exact requirements for "maintenance" have not been established by the NRC due to lack of sufficient information, or the requirements have been established and are listed in the primary source, "Nutrient Requirements for Domestic Animals," but the author of the text could not find the information or chose not to include it in the article.

The Examiner's objections as to the requirements of essential trace elements ignore the well established knowledge at least by the time of the effective filing date of this case regarding

nutrient requirement of animals. The essentiality of an element is often determined based on studies that demonstrate the development of deficiency symptoms consistent with the known biological role of the trace element if the animal is fed diets that are void of the trace element. Often, it is stated in the scientific literature that a trace element is found to be essential in a given list of species. This does not mean that the trace element is essential only in the species on the list and is not essential in the species not included on the list. It only means that these are the only species for which sufficient information is available to demonstrate essentiality. Other species have not been studied at all or sufficient information is currently not available. Once it is demonstrated that an element is essential in humans and animals, studies are undertaken to determine exact requirements.

The exact requirements of a trace element depend on the species, the time in the life cycle of the animal, the nature and amount of other nutrients in the diet, and the desired outcome of the feeding program. The Committee on Animal Nutrition of the National Research Council publishes a series of volumes entitled "Nutrient Requirements of Domestic Animals." Each volume addresses a specific domestic animal group. For example, one volume provides information on "Nutrient Requirements of Swine;" another "Nutrient Requirements of Dairy Cows." These volumes are comprehensive and demonstrate that it is impossible to accurately present the requirements of essential trace elements in the context of a claim in a patent application. Thus, the Examiner's objections should be withdrawn as the term "essential trace element . . . to an animal" provides sufficient information to describe the requirements of essential trace elements with respect to various animals.

Claim Rejection – 35 U.S.C. § 102 - Kirschner

Claims 1 and 2 were rejected as anticipated by Kirschner. Applicants respectfully traverse this objection. It is the theory of the Examiner's obviousness rejection that Kirschner teaches a method for providing prenatal nutritional supplementation containing ferrous glutamate (see column 12, lines 9-10) to pregnant women in dosages of from 10 mg to 200 mg (see column 12, lines 14-15), and further says that one of the intended usages of this composition is in animal feed. (See column 8, lines 65-66). The Examiner argues therefore Kirschner is identical with Applicants' claims.

The Examiner's obviousness rejection is problematic in several areas. Kirschner fails to make the invention defined in method claims 1 and 2 obvious for at least the following reasons. The invention described in Kirschner relates specifically to "novel chewable prenatal nutritional supplements which contain vitamin C, as well as novel methods for providing optimal vitamin C supplementation to pregnant women." (Kirschner Patent Abstract). The examples and claims of U. S. 6,352,713 B1 relate to mixtures of selected ingredients incorporated into nutritional supplements that "were prepared using conventional methods and materials known in the pharmaceutical art" (column 17, lines 13-14). The Kirschner invention does not describe the preparation or properties of any of these ingredients in detail. The scope of the present claims relates to specific complexes of trace metals and enhanced bioavailability to serve as feed ingredients. In the present application, the structure of products is provided, identity is confirmed by FTIR and HPLC, and homogeneity is demonstrated by HPLC. The elemental analysis of products is meaningful and confirms purity. One is left to guesswork in Kirschner.

Secondly, Kirschner claims "a substantially non-acidic chewable prenatal nutritional composition" containing a variety of ingredients commonly used in human nutrition. For each

nutrient, Kirschner lists possible sources of the nutrient without fully describing the nature and properties of the source. Beginning with column 12, line 5, the inventors list 14 commercially available sources of iron. One of these is ferrous glutamate. However, Kirschner also states on lines 12-13 of column 12, "Preferably, the iron compound is ferrous fumarate, carbonyl iron or mixtures thereof." This indicates that ferrous glutamate is not a preferred source of iron and would not inspire others to pursue these compounds for further development. It should be emphasized that the exact nature of ferrous glutamate is not specified by Kirschner. A substance containing iron in the ferrous state and glutamic acid could be one of three different chemical entities, or a mixture of two or all three. Indeed, the substance that was used in the past as a source of iron and sold as Ferrous Glutamate is of indefinite structure and appears to be a mixture of more than one chemical entity.

The purpose of the present application is to invent and use for nutrition a complex containing one ion of the trace element for each molecule of the dicarboxylic α-amino acid, whereby the molecule of the complex carries a net zero charge. This complex will have commercial utility by being superior to currently available products for trace element feed supplements. This required the identification of desirable chemical, physical and nutritional properties. Based on these three requirements, potential complexes were designed and then prepared. The physical and chemical properties of these complexes were determined and the complexes that possessed the desired properties were selected. The bioavailability of selected complexes was determined in animal studies (see Example 9). Complexes shown to have superior bioavailability in animal studies were further evaluated for improving the performance of livestock. Kirschner, as evident by its classification (cl 424/441), relates to humans. It should be apparent that nothing that has been disclosed in Kirschner would make any part of this

application's problem or its resolution *prima facie* obvious. The Examiner's assertion that the inclusion of ferrous glutamate in a list of examples of iron compounds provides guidance to the invention described in this application is unreasonable. Kirschner lists more than 100 compounds including vitamins, minerals and antacids. All of these compounds are commercially available well-known compounds, including ferrous glutamate that are or have been used as nutritional supplements in humans. Some of the substances listed in Kirschner, including ferrous glutamate, are of indefinite composition (possibly defining three compounds) and their efficacy for the present method has not been demonstrated. Therefore, Kirschner does not provide any new or unique knowledge that make claims 1 and 2 obvious.

The novel aspects of the appealed claims include the methodology and the invention of complexes of precise chemical structure, describing methods for their preparation of high yields, providing evidence of their chemical, physical, and biological properties, documenting their physical properties and ability to use them to improve the performance of livestock, and demonstrating their commercial utility in the method. None of this is *prima facie* suggested by Kirschner. Thus, careful examination of "the differences between the subject matter sought to be patented and the prior art" would clearly indicate that "the subject matter as a whole" would have not be obvious from Kirschner at the time of the invention.

Claim Rejection – 35 U.S.C. § 102 - Henry

Claim 1 was rejected as anticipated by Henry. Applicants respectfully traverse this objection. It is the theory of the Examiner's anticipation rejection that Henry discloses a zinc aspartate compound (see column 7, lines 13-16) to be used in the beverage dry mix (see column 7, lines 16-27). The Examiner argues therefore Henry is identical with Applicants' claim 1.

Henry states in column 7, lines 13-25, "the zinc compound which can be used in the present invention can be any of the commonly used forms such as" and then lists a variety of "commonly used" zinc forms including zinc aspartate. Most of the zinc forms listed are salts of zinc and not complexes. Henry, like Kirschner in the prior rejection, does not provide any information on the exact nature of "zinc aspartate." In examples 1-3 and 5-9, zinc gluconate is listed as the zinc form used. This is a salt of zinc and gluconic acid which contains one zinc ion for every 2 molecules of the gluconate anions. Henry's compound is not neutral as is Applicants'. The neutrality of Applicants' complex – one ion of an essential trace element for each molecule of the dicarboxylic α-amino acid – is the novelty which makes it highly useful. The term "neutral complex" represents a specific group of compounds in which the metal is bound to a ligand to form a stable entity that does not dissociate readily into its components. In contrast to complexes, salts are readily dissociated into its component ions. Individuals of ordinary skill in the art of chemistry readily recognize the difference between salts and complexes, and are able to decide which of these to use for a specific application. In no instance is a "neutral complex" taught to include salts. Therefore, a person of ordinary skill would readily differentiate between Henry, where a salt is used, and the present application where a neutral complex is used. Claim 1 is therefore not rendered obvious by Henry, and Applicants respectfully request this ground for rejection be withdrawn.

Claim Rejection – 35 U.S.C. § 102 - Nikiforov

Claims 1 and 2 were rejected as anticipated by Nikiforov. Applicants respectfully traverse this objection. It is the theory of the Examiner's obviousness rejection that Nikiforov discloses a feed for hens containing a casein complex with zinc glutamate in order to show Al, barium, and silicon in egg albumin. The Examiner argues therefore Nikiforov is identical with

Applicants' claims. The Examiner points to the Nikiforov reference which is vague and ambiguous. It cannot be seen how this reference can create a *prima facie* case of anticipation of the methodology of claim 1 since the reference does not teach the steps of claim 1 or the preparation of the same compounds. The reference only states "Hens given the combination of the casein complex and Zn glutamate showed increased Al, barium [7440039-3], and silicon [7440-21-3] in their egg albumin, and decreases of these elements in the shell." The vague term "zinc glutamate" could refer to three distinct different moieties, only one of which would be a neutral complex. It is simply guesswork as to which. Such a vague and ambiguous reference is inconsistent with acceptable practices for providing a reproducible scientific description of experimental methods and cannot make obvious Applicants' claims 1 and 2. Applicants respectfully request this ground for objection be withdrawn.

Claim Rejection – 35 U.S.C. § 102 - Godfrey

Claims 1 is rejected as anticipated by Godfrey. Applicants respectfully traverse this objection. It is the theory of the Examiner's rejection that Godfrey discloses a zinc supplement containing zinc aspartate compound (see column 3, lines 47-50) to be used for oral usage with no aftertaste (see column 3, lines 15-17) and, therefore, argues that Godfrey is identical with Applicants' claim. Godfrey describes mixtures of zinc compounds and amino acids and not specific complexes as described in Applicants' invention. Godfrey states "It has also been found that complexes between zinc and the named amino acids having the composition Zn(amino acid)$_2$ are water-soluble . . . " (column 3, lines 35-44). These complexes are different than the complexes described in the instant application which contain one molecule of the amino acid per zinc ion. Godfrey goes on to state ". . . certain other amino acids such as aspartic and glutamic acid are not useful for this purpose (column 3, lines 41-46). Therefore, it has been found that it is

not possible to predict which zinc and amino acid combination will have an acceptable taste unless it is prepared and tested." It is not understood how it would have been obvious to have prepared Applicants' neutral complexes based on the uncertain and different teachings of Godfrey. For these reasons, the Godfrey reference is not relevant to the instant application. Applicants respectfully request this ground for objection be withdrawn.

Claim Rejection – 35 U.S.C. § 102 - Kaczmarczyk

Claim 1 is rejected as anticipated by Kaczmarczyk. Applicants respectfully traverse this objection. It is the theory of the Examiner's rejection that Kaczmarczyk discloses the parental administration of magnesium chloride and magnesium aspartates, such as Mg L-aspartate, Mg DL-aspartate to magnesium deficient rats. The Examiner argues therefore Kaczmarczyk is identical with Applicants' claim. As with the Godfrey reference noted by the Examiner, the Kaczmarczyk reference is equally as vague and ambiguous. It cannot be seen how this reference can create a *prima facie* case of anticipation of the methodology of claim 1 since the reference does not teach the steps of claim 1 or the preparation of the same compounds. The vague terms Mg DL-aspartate and Mg L-aspartate do not provide a specific description as to which compound is used. The terms are not specific as to refer to a neutral complex as in the instant application. Again, it is simply guesswork as to which compound is used. Such a vague and ambiguous reference is inconsistent with acceptable practices for providing a reproducible scientific description of experimental methods and cannot make obvious Applicants' claim 1. Applicants respectfully request that this ground for objection be withdrawn.

Claim Rejection – 35 U.S.C. § 103(a) - Moore

Claim 1 is rejected as unpatentable over Moore. Applicants respectfully traverse this rejection. It is the theory of the Examiner that although the instant invention differs from this

prior art in that the 1:1 neutral complex of an essential trace element and a dicarboxylic α-amino acid is recited, the instant application is unpatentable because it is possible that a skilled artisan in the art would be able to prepare the 1:1 neutral complex of the Fe element and the glutamic acid from the teachings of Moore. The Examiner's assertion that Moore provides guidance to produce Applicants' 1:1 neutral complex appears to be based on an incorrect interpretation of Moore. The purpose of Moore is to prepare amino acid transition metal chelates homogeneously mixed with fatty acids to provide a source of transition metals for animal nutrition from lipoproteins and transition metal salts. (See column 2, lines 46-50). It is the resulting metal chelates, preferably between 1.8 and 2.5 molecules of amino acid that is the purpose of Moore (see column 3, lines 17-25); a compound that is not a 1:1 neutral complex. It can hardly be said that where Moore's preferred embodiment is a metal chelate which is not neutral was obvious to the instant invention when the two are distinctly different compounds and of distinctly different utility.

The physical, chemical and biological properties of the neutral complexes described in the instant invention are significantly different than those of the aqueous mixture of amino acid transition metal chelates and fatty acids disclosed in Moore. Indeed, at column 1, lines 39-47, Moore draws the distinction between chelates and 1:1 complexes of α-amino acids: "The foregoing patents refer to complexes and not to chelates. Complexes are not necessarily chelates, but chelates are considered to be special ring structured metal complexes." This shows that the neutral complexes disclosed in the instant invention are not anticipated by Moore since they do not meet the requirements specified in the statement.

The claimed 1:1 neutral complexes of the instant invention were discovered only after a multi-step, deliberate process to synthesize and select those with the desired properties of

improved bioavailability, higher metal content, and excellent physical properties making them easier to manufacture, ship, store, and blend. The novel features of the invention are not rendered obvious by Moore for the foregoing reasons. Applicants respectfully request the Examiner to withdraw the ground for objection.

Claim Rejection – 35 U.S.C. § 103(a) - ICN

Claim 1 is rejected as unpatentable over ICN. Applicants respectfully traverse this rejection. It is the Examiner's assertion that although the instant invention differs from this prior art in that the 1:1 neutral complex of an essential trace element and a dicarboxylic α-amino acid is recited, the ICN reference offers guidance that the synthetic amino diet composition can be adjusted depending on its use. The Examiner's assertion appears to have no correlation or relevance to the instant invention. The one-page ICN reference used by the Examiner is presumably from a catalog which offers purified Animal Research Diets. The Examiner appears to make a correlation between this reference and the instant invention because the reference contains the words "synthetic amino acid." As noted in the foregoing arguments, the instant invention required much more than looking at a reference containing the same words. The claimed 1:1 neutral complexes of this invention were discovered only after a multi-step, deliberate process to synthesize and select those with the desired properties of improved bioavailability, higher metal content, and excellent physical properties. It was not just a matter of changing a prior art ratio as suggested by the Examiner. Additionally, the Examiner's reference is silent as to any utility of the amino acid other than for a control diet. The reference does not provide guidance as to chemical, physical or nutritional properties. Nor does it suggest, one way or the other, the neutrality of the complex. The Examiner's argument that a person skilled in the art would arrive at the claimed complexes of the instant application and their novel features by

looking at one page from the ICN catalog is without any legal merit. Claim 1 is therefore not rendered obvious by ICN and Applicants respectfully request that this ground of rejection be withdrawn.

Conclusion

No fees or extensions of time are believed to be due in connection with this amendment; however, consider this a request for any extension inadvertently omitted, and charge any additional fees to Deposit Account No. 26-0084.

Reconsideration and allowance is respectfully requested.

Respectfully submitted,

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